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WHEAT SCAB.

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A disease of wheat became prominent in the vicinity of LaFayette, Ind., this season (1891,) of which little seems to be recorded. It appears to be familiar to many farmers, who call it by the not inappropriate name of *scab*, and in spite of the fact that it has almost escaped the attention of critical observers, it is doubtless an old and wide-spread disease.

Its presence in the field becomes noticeable when the heads have reached full size, and especially just before ripening. A part of the head, more often the upper portion, turns pale yellow and appears prematurely ripe. The mixture of green and yellow in the same head makes it easy at this stage of growth to detect the affected heads at a glance. Examination of the kernels of the prematurely ripened portion will show them greatly shrunken, and the lowermost ones especially will be moldy and worthless. Any part of the head may be attacked, and limited portions, or in severe cases, the whole head injured and rendered valueless.

The loss from scab in the vicinity of LaFayette is very uneven. It was reported by Mr. S. P. Baird to reach 20 per cent. in his fields, as near as he could estimate. Upon the Station farm one field was thought to have suffered to the extent of 10 per cent; others contained less amounts, and some were quite free. Some examinations of the wheat in Jefferson county, in the extreme southern part of the state showed the presence of the disorder, but only in insignificant quantities. The disease is of such a nature that under favorable conditions it might cause a loss only limited by the size of the crop.

The heaviest damage, that has come to the notice of the writer, amounted to 70 or 80 per cent. of the yield, and was reported from a neighboring state last year. "In Madison county, Ohio, a field of one hundred acres, considered the finest wheat field in the county, which was expected shortly before the harvest to yield 35 or 40 bushels per acre, was severely attacked by the disease, and the yield was reduced to eight bushels per acre. Two other fields, one of 25 and the other of 50 acres, were shrunken in yield from the same cause at least one-third."*

The most prominent feature of the disease, and one which will distinguish it from insect and other injuries, is the presence in the ad-

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*Clarence M. Weed, Proc. Soc. Prom. Agric. Sci., 1890, page 48.

vanced stages of a pinkish color over the surface of the chaff, especially along the edges and at the base. This color belongs to a very thin layer of adhesive substance which glues the chaff together over the grain, and gives rise to the name "scab."

The disease is due undoubtedly to the inroads of a fungus. In the beginning the fungus appears to gain access to the tender kernel, sapping its life and sending down feeders into the main axis of the head on which the kernel and enclosing chaff are borne. The functions of this part of the plant soon become locally deranged, and in consequence, the supply of nutriment for the portion of the head above the affected part is cut off, causing it to stop growing and lose its green color. As the fungus develops, it produces great numbers of spores which give the pinkish color to the affected parts.

The fungus belongs to the genus *Fusisporium*, or according to the later classification of Prof. Saccardo, to *Fusarium*. It may be the form reported upon wheat in England by Mr. Worthington G. Smith,* and called by him *Fusisporium culmorum*, but it is difficult to be certain from his brief description.

Upon the Station grounds there are fields devoted to testing varieties of wheat, sown side by side in narrow strips 5½ feet wide and 20 rods long. The varieties were very unequally attacked by the disease. Two varieties, especially, both French wheats, were very much affected. One of these plats, the *Hybride Larned*, was carefully examined to determine the amount of damage. All the heads in a drill for five or six feet were counted, and also those injured by the scab. This was repeated in different parts of the plat. The result showed that of 2525 heads counted 561 were more or less affected with scab, or 22 per cent. The count was made July 1st, only a few days preceding harvest. The heads were not, as a rule, entirely destroyed, and the actual loss may be set at about 15 per cent. of the crop.

On one side of this strip of wheat was another French variety about equally affected with the scab, and on the opposite side was an American variety practically free from scab, as were most of the other varieties. The two French wheats had shown signs of weak growth in the early part of the season, when they were attacked by what appeared to be a bacterial disease of the leaves, giving them a mottled green color, and causing the tips to die. It is probable that the weakened condition of the plants favored the attack of the scab.

This view is the more probable, as most of the near relatives of this fungus thrive best upon dead or decaying animal or plant substances,

*Smith. Diseases of field and garden crops. London, 1884, page 208.

especially upon dead stems of various sorts. Thus the weaker the host plants, and the less able to withstand invasion, the more readily the fungus might be expected to take possession and to flourish at their expense.

Another instance corroborating this view was observed upon the Station farm. Some plats lying side by side were sown with the same variety of wheat, but at different times. The late sown plats contained far the most scab, even a week's difference in the sowing having an effect. The following table shows the result of the count:

SCAB IN WHEAT.

Date of sowing.	No. of heads counted.	No. of heads with scab.	Percentage of scab.
September 19	2086	33	1.5
October 10	883	53	6.0
October 17	1192	82	7.0

It will be seen that wheat sown three weeks later than the usual time contained four times the amount of scab, and wheat, sown one week later yet, contained five times the amount of scab. The most probable explanation of these differences appears to lie in the varying vigor and resisting power of the wheat plants. That the late sown wheat was not so well developed as that sown earlier is well proven by the yield of grain, which was at the rate of 38 bushels, 34 bushels and 22 bushels per acre respectively for the plats sown September 19, October 10 and October 17.

Another factor may have had something to do with the differences in the amount of scab. The fungus probably makes its attack at or about the time of flowering. The spores, borne upon the wind, lodge in the open flower and grow into the wheat head. A difference in the time of flowering might therefore influence the attack of the disease, dependent upon the state of the weather and upon the accidental presence of spores in the atmosphere. The spores may be blown from one head to another, and thus spread the disease throughout a field or neighborhood. The danger, consequently, of later flowering heads being infected with spores from adjoining fields of earlier sown grain is very considerable.

It will be quite evident from the foregoing that the nature and fertility of the soil, the amount of under drainage, the rate of growth, etc., have little to do with the presence of the disease, and also that the par-

ticular variety of wheat holds no very important relation to the disease.

No remedies or preventives can be recommended at present, except such as are self-evident.

SUMMARY.

1. A little known disease of wheat called *scab*, has caused a loss of ten to twenty per cent. in certain fields about LaFayette, Ind.

2. It is due to the attack of a fungus, a kind of mold.

3. It causes parts of the head to appear prematurely ripe, the kernels in such parts being shriveled and worthless.

4. The chaff is glued together with a pinkish adhesive coating, which is not, however, very conspicuous.

5. Late sown and poorly grown wheat suffered most.

6. Vigorous growth and early blossoming are the chief safe-guards against the disease.